

Date: Wed, 9 Nov 94 04:30:44 PST
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: List
Subject: Ham-Homebrew Digest V94 #331
To: Ham-Homebrew

Ham-Homebrew Digest Wed, 9 Nov 94 Volume 94 : Issue 331

Today's Topics:

300 Watt AM transmitter
Chebychev: cheb.c
Dentron digital display board
HELP NEEDED PLEASE ANYONE!
PCB Board from laser print?? (2 msgs)
PCB from laser print?
Q: TRX kit assembly - What should I know?
Quad Op Amp ??
Vacuum Variable Mounting?
Where can I find a grid dip meter?
Where does the power go? (2 msgs)

Send Replies or notes for publication to: <Ham-Homebrew@UCSD.Edu>
Send subscription requests to: <Ham-Homebrew-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Homebrew Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-homebrew".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: Tue, 8 Nov 1994 05:28:54 GMT
From: clifto@indep1.chi.il.us (Clifton T. Sharp)
Subject: 300 Watt AM transmitter

In article <39kb7f\$3m7@newsbf01.news.aol.com> skeeterbdg@aol.com (SkeeterBDG)
writes:

>All Omnitronix transmitters are 100% solid state using extremely efficient
>pulse duration modulation (PDM) techniques. The nominal frequency range
 ^^^

I LIKE IT!!!

--

Cliff Sharp Never get into fights with ugly people.
WA9PDM They have nothing to lose.
clifto@indep1.chi.il.us --The Fourth Law of Reality

Date: Tue, 8 Nov 1994 15:17:29 GMT
From: novatech@eskimo.com (Steven Swift)
Subject: Chebychev: cheb.c

mike@io.org (Mike Stramba) writes:

>Could you post an example of the input data to give this program and
>a corresponding schematic for the filter?

>Mike

>--

>=====

>Mike Stramba	Email: mike@io.org
>Toronto,Canada	Internex Online - Toronto, Canada (416) 363-3783

>=====

Give me a few days, and I will post examples for each program.

--

Steven D. Swift, P.E. (novatech@eskimo.com)
NOVATECH INSTRUMENTS, INC. 1530 Eastlake Avenue East, Suite 303
206 328 6902, FAX 206 328 6904 Seattle, Washington 98102 USA

Date: 8 Nov 94 14:15:11 GMT
From: hysell@itc.Kodak.COM (John D. Hysell)
Subject: Dentron digital display board

Hi all;

Can anyone provide me with information on the Dentron digital display board that Dan's Small Parts and Kits sells? Dan provides a parts placement and schematic diagram, but what I really need is a copy of the original magazine article, usage info and troubleshooting tips.

Send replies to hysell@kodak.com

Thanks and 73 de KF2XC

-John

Date: 7 Nov 1994 17:15:08 -0500
From: dbotkin@aol.com (D Botkin)
Subject: HELP NEEDED PLEASE ANYONE!

In article <sdarragh-011194090408@sdarragh-mac.cisco.com>,
sdarragh@cisco.com (Scott Darragh) writes:

8< snip...

Questions:

#1 Anyone know of any plans for such a beast?
#2 Can I use the same dial to tune all the bands or will I need to
incorporate many tuning knobs?

8< snip...

Check out the ARRL Handbook, especially older ones from the late 70's &
early 80's. Also, the book "QRP CLASSICS" has some nice designs.

You can build one that uses one tuning knob for all bands. Basically, you
use a VFO tuning a fairly narrow range and mix it with xtal oscillators
for the different bands, which you switch in (along with the output
filters) with a bandswitch. For example (off-the-cuff), use a 3.675 to
3.725 oscillator alone for 80, mix it with a 3.42 osc. for 40, mix it with
a 17.42 osc. for 15, etc. This is an illustrative example ONLY, there are
LOTS of good plans for multi-band QRP rigs out there.

72,
Dale Botkin, N0XAS
dbotkin@aol.com
n0xas@n0xas.#ene.ne.usa.na (packet)

Date: 8 Nov 1994 05:57:14 GMT
From: magoo871@goshawk.csr.v.uidaho.edu (Magoon Steve)
Subject: PCB Board from laser print??

Sean Norris (snorris@harp.aix.calpoly.edu) wrote:

> I'm working on a project that requires me to make a PC board and I want
> it to be as hassle free as possible. I have seen many ads about some
> special paper which you can print with a laser printer, iron it onto the
> PC board, peel it off and then etch. Has anyone used this technique? If
> so, is it reliable? My project is all surface mount and at very high

Sean,

I tried that technique a couple of times and got bad results both

times. For some reason I couldn't get the toner to transfer successfully - the results were spotted at best. But don't take my word for it though; I sure could have been doing something wrong.

The photographic process has worked well for me. It seems that most folk like to use the "positive" process. I've been using the negative for several years now. Unfortunately it can be a mess and a lot of effort. Maybe someone else has done well with the toner transfer process and would comment?

Steve
magoo871@uidaho.edu

Date: 8 Nov 1994 19:00:43 GMT
From: mds@meaddata.com (Michael Suhar)
Subject: PCB Board from laser print??

|> The photographic process has worked well for me. It seems that
|> most folk like to use the "positive" process. I've been using the
|> negative for several years now. Unfortunately it can be a mess and a lot
|> of effort. Maybe someone else has done well with the toner transfer
|> process and would comment?

|> Steve
|> magoo871@uidaho.edu

--
I have had poor results with the TEK200 also. I thought it might have been from poor toner image from the copier so I tried to use an HP laserjet 4, 600 dpi, printer. I set the printer for maximum density and printed the artwork. To ensure the printer had stabilized to print a darker image I ran about 20 copies on plain paper before running the TEK transparency through. What I got was drop outs in the middle of my traces. This is an indication that the transparency is not proper for the print engine. I see this when transparencies for copiers are used on laserjet printers. I really needed this PC board, so ran a transparency through the laserjet that was designed for this printer. I got a nice dark image without drop outs. Now the question was would it transfer to the board? The board must be very clean so I placed the PC board in ferric chloride several seconds until the copper was a uniform pink. I removed the oxidized haze from the board with Soft Scrub and a cloth. Using an iron I heated the transparency to the PC board. My board was 3 x 3 inches. I let the board cool down to room temperature then tried to peel the transparency off of the board. I was concerned that the transparency would hold the toner better than the copper, thereby pulling the toner off of the pc board. I pulled very slowly and to my surprise the toner stayed on the board! This is the first time direct toner process worked. So much for the special paper!

I understand that the DynaArt product may be the best product for direct toner pc boards. They have a catalog that includes special toner cartridges designed for their transparency and a laminating heater to run the pc board through to "melt" on the toner. The heater is a little expensive, but if you want to do direct toner transfers and minimize the errors this may be the way to go.

I still prefere the photographic mehtod. I get PC boards presensitized with a positive resist from PCB Kits. This eliminates the problem of getting the resist to stick to the board with an even coating. I make the positive artwork with my PC and the laserjet 4. The laserjet appears to be accurate enough for my purposes. The EASY PC program allows you to calibrate the laserjet to reduce errors as the transparency moves through the printer.

Mike Suhar WB8GXB
mds@meaddata.com

Date: Mon, 7 Nov 1994 16:19:31 -0700
From: alf@agreen.iac.honeywell.com (Alf Green)
Subject: PCB from laser print?

snorris@harp.aix.calpoly.edu (Sean Norris) wrote:

> I'm working on a project that requires me to make a PC board and I want
> it to be as hassle free as possible. I have seen many ads about some
> special paper which you can print with a laser printer, iron it onto the
> PC board, peel it off and then etch. Has anyone used this technique? If
> so, it it reliable? My project is all surface mount and at very high
> frequencys so the traces must be small and sharp.
> If anyone has any experience/tips/brands/etc. I would appreciate it very
> much if you could E-mail me.

> Thanks,

> Sean

> -----
> Sean Norris snorris@trumpet.aix.calpoly.edu
> --KE6BTE-- Loyalty, above all else.
> -----

Yes, I have used a version of this special film, TEK200 from Meadowlake. I have never been able to get really good results. I can get it to print ok on my laserjets (Canon LBP-8 and HP LJ2), or using a Xerox copier. The problem is transferring it to the board. No matter how clean the board, or

however I set the iron, it never transfers to the extent where I consider the touchups to be acceptable.

There was quite a discussion on this topic a while back, either here or on sci.electronics, and several contributors claimed to get good results. I guess I must be doing something wrong.. 8-(

I prefer the photoresist method. Its a bit more effort but gives excellent results. I have not had much success printing to mylar film; (it appears to depend on how hot something is in the printer). Someone here suggested printing to tracing vellum but I dont know how easily available that is. The approach I take is to print to regular paper stock, then brush on vegetable oil to make the paper translucent. Using a regular 500w UV photoflood and Datak negative resist, I get really excellent images with 15 minutes exposure.

One other hint: etching is much faster if you use a shallow dish and blow a hair dryer on it at close range. This heats the solution and agitates it really well. This cuts the etch time from ~40 minutes to about 10 mins, which helps to prevent undercutting and ragged edges.

Good luck.

Alf NU8I/G4ABB

alf@agreen.iac.honeywell.com
Phoenix, Arizona

Date: 8 Nov 1994 03:48:42 -0600
From: martin%dacws2%dac.isei.jrc.it@cen.jrc.it (IK2RMZ)
Subject: Q: TRX kit assembly - What should I know?

Hello QRP fans,

Just received a DTR 7 kit (British kit for a monoband TRX 7 MHz)

Got sum experience in homebrewing but never tried a kit...
Is there anybody here who built one already?
Experiences? Problems?
Should I know anything that is not in the manual?
If you do not know that particular kit do you have some
general advices for me?

Cuagn in QRP

Martin IK2RMZ
(Always qrv for sked requests, qrp and barefoot 100w, all

HF bands, only wire antennas)

If u decide to post a public reply pse send a copy to
my e-mail account martin.zurn@cen.jrc.it. Thanks.

Date: Tue, 8 Nov 1994 17:04:57 GMT
From: bart@wb6hqq.ampr.org (Bart Rowlett)
Subject: Quad Op Amp ??

In article <39cjco\$1qki@usenetw1.news.prodigy.com>,
FRANK DAMERON <DFNF67A@prodigy.com> wrote:
>I am building the gel cell charger that is in the 1993 ARRL handbook. I
>am out of town at the moment and do not know the page number or the name
>of the project in the handbook. However, it is a small charger that will
>charge gell cell batteries and can be switched between a full charge and
>float charge. The project calls for a LM3900 Quad Op Amp. I bought a
>LM2900 and was told that it work just as well and that the pinouts are
>the same.
>
>Now that I have the project almost finished I cannot get it to work
>properly. I get the right test voltage and when i adjust the trimpots
>the LED idicator will not light to tell me there is a full charge. I
>checked and rechecked the wiring, solder joints, voltages and the LED.
>
>Will the LM2900 work the same as the LM3900??

Yes. The LM2900 is just the industrial temperature version of the LM3900
and should meet or exceed all data sheet specifications.

bart

bart@wb6hqq.ampr.org

Date: 8 Nov 1994 16:56:48 GMT
From: rvt@susie.sbc.com (Roger V. Thompson)
Subject: Vacuum Variable Mounting?

OK, so now I have a vacuum cap for the linear project I've been
planning for 10 or 15 years...

How are vacuum variable caps ordinarily mounted? Handbook photos
don't show me much detail except for the use of turns counting
dials for tuning.

A related question - do vacuum variables have mechanical stops?

--

Roger V. Thompson, P.E.	ARS AD5T
Southwestern Bell Technology Resources, Inc.	314-529-7847 (Office)
550 Maryville Centre Dr.	314-529-7674 (Fax)
St. Louis, MO 63141	rvt@calvin.sbc.com

Date: 8 Nov 1994 03:47:31 GMT
From: Jeff Duntemann <jeffd@coriolis.com>
Subject: Where can I find a grid dip meter?

If you really want a *grid* dipper, I can find some articles in my piles of old QSTs. The unit I own is very good: It's the AN/PRM-10 military dipper, bought about fifteen years ago at a hamfest for \$10. I've seen them intermittently for sale from places like Fair Radio. Keep your eyes open. It's a terrific unit, built like a tank, as you might imagine.

Building a FET dipper is a snap; not even a weekend project if you're good mechanically. I think the most recent Handbook has a circuit, and if not that then look at some of the other ARRL books. Even calibration isn't an issue anymore. You dip the circuit, then hold the dipper near the pickup on your frequency counter. I built one that didn't even have dial marks, and it was perfectly useful! But I keep going back to the AN/PRM-10.

Good luck with it.

--73--

--Jeff Duntemann KG7JF, Scottsdale AZ

Date: Tue, 8 Nov 1994 19:13:53 GMT
From: tomb@lsid.hp.com (Tom Bruhns)
Subject: Where does the power go?

Yauwah Benjamin Sam (bens@adelie.cse.tek.com) wrote:
: Dear homebrewers,

: I've follow this thread for a couple of weeks and Tom Bruhn's post is the
: first one that accurately describes the situation. Too bad that he did not
: go on to explain the whole reflection deal and efficiency problem (I guess he
: is not ready to write a book yet).

Benjamin sure got that one right! Sorry if I left things hanging; I'd really like to add more, but it really could get to be a book quickly. I'd like to summarize two points, though:

1. You may be able to accurately represent a source (transmitter) as a Thevenin or Norton equivalent over some range of operation (linear region), but that model doesn't tell you what goes on inside the source (transmitter). You have to know how it's built to understand that. You have to know about things like SWR protection and RF negative feedback. You have to understand the DC operating point and the collector/plate/drain characteristics of the active device(s). You have to understand how a load at the terminals is translated to a load seen by the active devices. And you have to know what that load actually is. Ultimately, you have to know about losses in the whole output circuit, though in a good design, a very big percentage of the loss will be in the output active device at the plate/collector/drain.
2. The load you put on a transmitter, whether it's a resistor connected directly or an antenna fed through a transmission line, as long as it's linear, can be represented as some impedance at the output terminals of the transmitter. There really are forward and reverse waves on a transmission line driven by a source, operating into a load that doesn't match its impedance, but in the steady state, that just appears as some impedance at the feedpoint. For the purposes of analysis of what's going on in the amplifier, it is exactly equivalent to think of a single load impedance, or forward and reverse waves of some phase and amplitude relationship. Pick which ever one is easier for you to understand and analyze.

Sub-point: you can't analyze amplifier efficiency unless you know a lot about what's going on in the amplifier, as you change load impedances. For example, you have to know that the amplifier is staying in a linear operating region if you want to apply any simple linear equations to find efficiency.

Date: 7 Nov 1994 22:06:52 GMT
From: bens@adelie.cse.tek.com (Yauwah Benjamin Sam)
Subject: Where does the power go?

In article <CynL9t.GBs@hpcvsnz.cv.hp.com> tomb@lsid.hp.com (Tom Bruhns) writes:
>Oh, dear. I should know better than to jump in here, but...
>
>First, if you model a source as a Thevenin or a Norton equivalent, you
>should be aware that it is just a model to tell you what you can measure at
>the terminals. It does NOT tell you, necessarily, what is going on inside

>

Dear homebrewers,

I've follow this thread for a couple of weeks and Tom Bruhn's post is the first one that accurately describes the situation. Too bad that he did not go on to explain the whole reflection deal and efficiency problem (I guess he is not ready to write a book yet). I would like to help clarify a couple more points frequently mistaken in several other posts:

1. The Output Power of a Transmitter or a Power Amplifier is the power delivered into the specified load (usually 50 ohm) for ease of measurement. A 100 W Transmitter should better deliver full 100 W into this load or you ought to get your money back. This has nothing to do with Efficiency at all (see item 2 below). When there is Standing Wave (SWR > 1) part of the power is reflected back:

$$P(\text{reflected}) = P(\text{incident}) * |\rho|^2$$

where ρ is the reflection coefficient and

$P(\text{incident})$ is the 100W available from the Transmitter;

$$\rho = (Z_L - Z_0) / (Z_L + Z_0)$$

where Z_L and Z_0 are the load and output impedance, respectively.

These formulas are simpler to use when the output impedance is equal to the cable's characteristic impedance (say 50 ohm in both cases). Otherwise we'll have to apply the formula to both ends of the cable and the actual power delivered to the load depends on the phase angle of the reflections (e.g. a 50 ohm cable can become the matching transformer between a 25 ohm source and a 100 ohm load).

2. So where did the power go?

First one has to understand that

$$\text{efficiency} = \frac{\text{Power delivered (when matched)}}{\text{DC Power put in}}$$

and what is not delivered is dissipated. A class A amplifier has max. theoretical efficiency of 50% and the DC Power doesn't change with load. So if our 100W transmitter requires 25V at 10A (250W, or eff.=40%) and you hook it to a 100 ohm load, then

$$\rho = (100 - 50) / (100 + 50) = .33$$

$$P(\text{del.}) = 100W * (1 - .33^2) = 89W$$

Now instead of dissipating 150W in the Transmitter itself you now dissipate 250 - 89 = 161W. Class B and class C amplifiers are more efficient and

dissipation changes with loading and signal amplitude, but the idea remains unchanged --> what is not delivered will be dissipated!
So if you have a 90% efficient amplifier (111W DC for 100W out),
and your load is again 100 ohm instead of the expected 50 ohm, i.e.
a rho of .33 as above, then the dissipation in your transmitter just doubled
(it is not exact as the total DC dissipation of class B or C amplifiers
changes with load).

Hope I did not create more confusion!

Benjamin Sam
yauwah.b.sam@tek.com

Date: 5 Nov 1994 23:27:15 GMT
From: Cecil_A_Moore@ccm.ch.intel.com

References<3998nm\$c4c@sunb.ocs.mq.edu.au> <1994Nov3.025729.14375@ke4zv.atl.ga.us>,
<39dq10\$idm@chnews.intel.com>
Subject: Re: Where does the power go

It just dawned on me that this discussion has boiled down to whether
reflected power acts like a wave or like a particle. A lot of us have
seen ocean waves reflected from the beach, flowing back out to sea, even
when there are tremendous incoming waves. The little waves going out seem
to disappear into the big waves and emerge on the other side seemingly
ignoring the energy of the incoming wave. The water molecules are moving
mainly up and down toward the shore but the outgoing waves maintain their
identity except for losses. There is energy*time=power in the outgoing wave.
Throw a rock in a river and one can see waves (not particles) moving upstream.

So it is with reflected power. The individual electrons are moved toward
the antenna by the generator but the reflected power wave keeps its identity
going in the opposite direction except for losses. There is energy*time=power
in the reflected wave. I suspect that the effect of hitting a stream of
water from a fire hose with a baseball bat can be measured at the nozzle
not because any actual water molecules travel against the stream but because
the shock _wave_ will have an effect throughout the system.

Visualize a transmitter connected to a dead short through 1,000,000 miles
of lossless transmission line. Key down for 15 seconds. SWR is 1/1 and
the transmitter is happy. Key up. Within seconds, the 100% reflected wave
hits the transmitter output. What happens? If the impedance looking back
into the transmitter is zero or infinite, all the power will be reflected
back down the transmission line and bounce back and forth forever. If the
impedance looking back into the transmitter is the characteristic impedance
of the transmission line, the transmitter final will heat up and dissipate

all the RF energy. In reality, some energy is dissipated in the ordinary (cheap) solid-state transmitter final and some is re-reflected. Some expensive test equipment has 50 ohms looking back into the generator because it was designed that way.

--

73, Cecil, KG7BK, 00TC (All my own personal fuzzy logic, not Intel's)

End of Ham-Homebrew Digest V94 #331
